Markup and Price Dynamics: linking micro to macro

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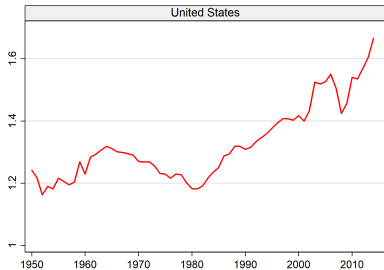
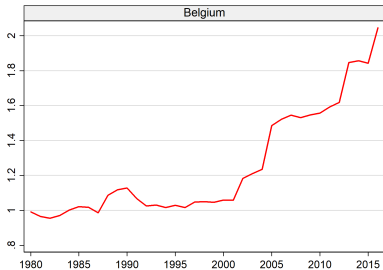[1]KU Leuven and CEPR   [2]National Bank of Belgium

EIB Luxembourg: *From Micro to Macro: Market Power, Firms Heterogeneity and Investment*

MOTIVATION

- Recent attention for aggregate markups and profitability calculated at the firm level
- Potentially important implications for aggregate economy
  - labor share in GDP, productivity growth measurement,...

U.S. (Compustat)   Belgium (Worldscope)

De Loecker-Eeckhout (2017, 2018)

Our focus in this paper

- Belgium (small open economy)
- Long panel (1978-2016)
- Universe of firms (lots of data challenges)
- Open questions:
    - Is there technological change (beyond Hicks-neutral)?
    - Did globalization lead to more competitive pressure? What is correct market size?
    - How to deal with accounting structure of globally operating MNEs?

Measurement of markups

- Apply the production-approach of De Loecker and Warzynski (2011)

  - Data of firms i at time t for sales (S_{it}), and expenditure on a variable input (E_{it}^V), and an estimate of the corresponding output elasticity (θ_{it}^V):

  $$\mu_{it} = \theta_{it}^V \frac{S_{it}}{E_{it}^V}$$

- Aggregation:

 $$M_t = \sum_i s_{it}\ \mu_{it}$$

Implementation challenge:
## Picking a variable input of production

- Labor: not very variable in Belgium
- Intermediate input purchases (come in two parts):
  - Goods Intermediates (**variable**): raw materials used in production
  - Service intermediates (**quasi-fixed**):
    1. Insurances
    2. Transportation/Travel/Catering
    3. Deliveries to the firm
    4. Availability fees
    5. Rent
    6. Maintenances and repairs
    7. Temporary and external work
    8. Wages, bonuses, pensions of CEO, partners and active owners.

TECHNOLOGY AND FIRM ORGANIZATION

$$y_{it} = \underbrace{\beta_g(t)\, m_{it}^g + \beta_s(t)\, m_{it}^s}_{Intermediates} + \beta_L(t)\, l_{it} + \beta_k(t)\, k_{it} + \epsilon_{it}$$
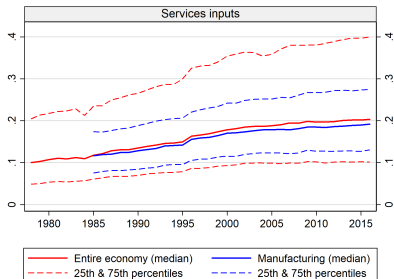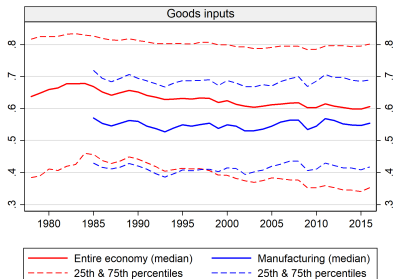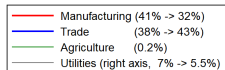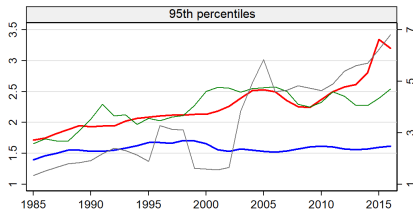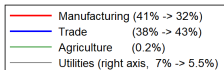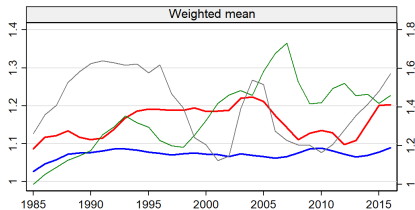
AGGREGATE MARKUP
BASED ON 'GOODS INTERMEDIATES'
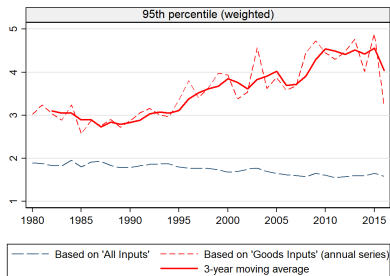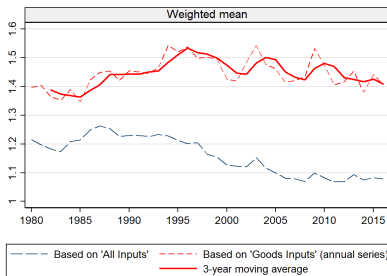
- Pattern radically different using goods- or services-intermediates

SELECTED SECTORAL MARKUPS
BASED ON 'GOODS INTERMEDIATES'

Weighted mean

Manufacturing (41% -> 32%)	
Trade (38% -> 43%)	
Agriculture (0.2%)	
Utilities (right axis, 7% -> 5.5%)	

95th percentiles

Manufacturing (41% -> 32%)	
Trade (38% -> 43%)	
Agriculture (0.2%)	
Utilities (right axis, 7% -> 5.5%)	

- Pattern shows an increase, but less pronounced than in the United States

- And growth over time is much less regular

Initial Findings

- Fundamental change in production process: rising importance of fixed factors

- Markup in the overall economy only increase over 1985-1995, and up to 2005 in manufacturing.

- Increase is driven by the dynamics in the sales-to-expenditure ratio (for goods-intermediates); not so much by the changing technology parameters

MARKUP GROWTH AND REALLOCATION

- Decompose ΔM_t into *within* and *reallocation* terms
- Two distinct decompositions: (1) GR95, (2) H97

  1. Actual (using average weights): $\bar{s}_{it} = \frac{s_{it}+s_{it-1}}{2}$, $\bar{\mu}_{it} = \frac{\mu_{it}+\mu_{it-1}}{2}$:

  $$\Delta M_t = \sum_{i\in\mathcal{I}} \bar{s}_{it}\Delta\mu_{it} + \sum_{i\in\mathcal{I}} \Delta s_{it}\tilde{\bar{\mu}}_{it-1} + \sum_{i\in\mathsf{En}} s_{it}\tilde{\mu}_{it} - \sum_{i\in\mathsf{Ex}} s_{it-1}\tilde{\mu}_{it-1}$$

  2. Counterfactual (using lagged weights): s_{it-1}, μ_{it-1}:

  $$= \sum_{i\in\mathcal{I}} s_{it-1}\Delta\mu_{it} + \sum_{i\in\mathcal{I}} \Delta s_{it}\tilde{\mu}_{it-1} + \sum_{i\in\mathcal{I}} \Delta s_{it}\Delta\mu_{it} + \sum_{i\in\mathsf{En}} s_{it}\tilde{\mu}_{it} - \sum_{i\in\mathsf{Ex}} s_{it-1}\tilde{\mu}_{it-1}$$

  - (In both decompositions, $\tilde{\mu}_{i\tau} = \mu_{i\tau} - M_{t-1}$, to accommodate En&Ex)

CONTRASTING BOTH APPROACHES

1. Within
   - Actual: $\sum_i \bar{s}_{it}\, \Delta\mu_{it}$
   - Counterfactual: $\sum_i s_{it-1}\Delta\mu_{it}$

2. Between
   - Actual: $\sum_i \Delta s_{it}\, (\bar{\mu}_{it-1} - M_{t-1})$
   - Counterfactual: $\sum_i \Delta s_{it}\, (\mu_{it-1} - M_{t-1})$

3. Cross-term
   - Only in counterfactual: $\sum_i \Delta s_{it}\Delta\mu_{it}$

4. Entry & Exit
   - Same for both: $\sum_n s_{nt}\tilde{\mu}_{nt} - \sum_x s_{xt-1}\tilde{\mu}_{xt-1}$

AT THE AGGREGATE LEVEL:
DECOMPOSE ACROSS/WITHIN SECTORS

1. Aggregate firm-level shares and markups to sectors: s_{It} & μ_{It}
2. Do both decompositions year-by-year
   - No entry and exit
   - Primary force is declining manufacturing sector (s_{It}: 41% $\rightarrow$ 32%)
3. Construct index from μ_{1985}, rolling all terms forward

DECOMPOSITIONS ACROSS SECTORS
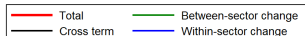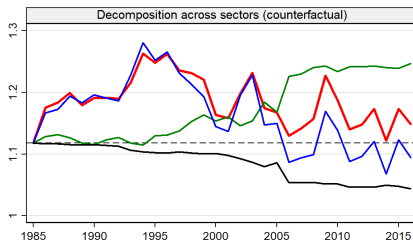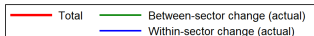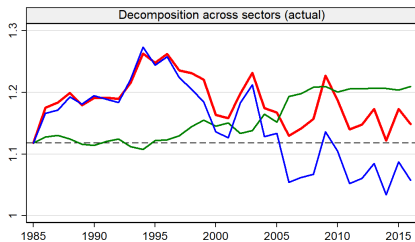
- 1985-1995: markup growth due to within sector change, then it reverses

- 1995-2007: markup growth due to between sector change, then stabilizes

- From 1992: $corr(\Delta\text{shares}, \Delta\text{markups}) < 0$ is a drag on the aggregate

At the sectoral level:
## Decompose across/within firms

1. Weight a_{it} is now firm-level within a sector, μ_{it} is firm-level markup
2. Do both decompositions year-by-year
   - Entry and exit contribute similarly in both decompositions
   - Driving forces are now within-sector and can vary
3. Construct index from μ_{1985}^I, rolling all terms forward

DECOMPOSITIONS WITHIN MANUFACTURING
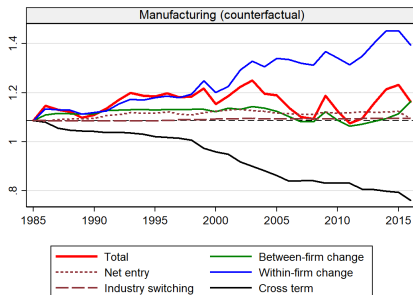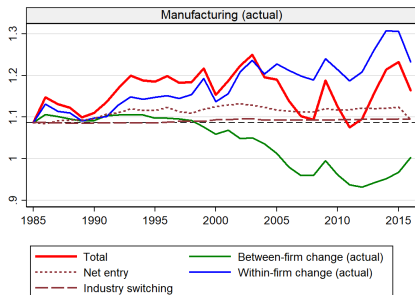
- Firm-level markups are growing over the entire period

- Between-firm reallocation is a drag on the aggregate from 1998

- This is entirely due to the cross-term which grows very large

DECOMPOSITIONS WITHIN TRADE
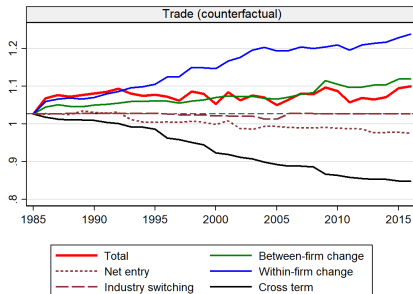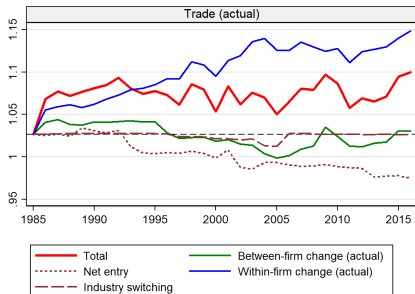
- Similar: firm-level markup growth is remarkably strong and persistent

- Aggregate is again dragged down by negative cross-term, while the between term is even slightly positive

- Firm exit makes a non-negligible, negative contribution as well

DECOMPOSITIONS: TAKEAWAYS

- Value of contrasting both decompositions: identify potential drivers or constraints on markup growth
  - (same analysis is possible for productivity analysis)

- Strong growth of the aggregate markup in the early period is dominated by within-firm (within-sector) markup growth

- Hypothetical decomposition suggests the aggregate markup would have increased much more, if not for the strong negative correlation between firm-level changes in weight and markup
  - The latter suggests factors that could help explain the different evolution from the one observed in the United States (market size, growth potential, mgmt quality,...)